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The opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.

Paper No. 19

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte JOHANNES P. VERDUIJN, GARY B. McVICKER
and JOHN J. ZIEMIAK

Appeal No. 95-2321
Application 07/855,016¹

ON BRIEF

Before KIMLIN, WEIFFENBACH and PAK, *Administrative Patent Judges*.

WEIFFENBACH, *Administrative Patent Judge*.

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 134 from the examiner's final rejection of claims 1-21 and 23-29. In an amendment after final rejection which was approved for entry by the

¹Application for patent filed June 30, 1992.

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examiner, claims 5 and 29 were canceled and claims 1, 3 and 6 were further amended.

Accordingly, claims 1-4, 6-21 and 23-28 are before us for consideration. We affirm.

Claimed Subject Matter

The claims on appeal are directed to a process for reforming a petroleum hydrocarbon feed stream by contacting the stream with a crystalline Zeolite KL catalyst which is impregnated with a metal hydrogen-dehydrogenation promotor. Claim 1 is representative of the claimed subject matter and reads as follows:

1. A process for reforming a petroleum hydrocarbon feed stream comprising contacting the stream under reforming conditions with a catalyst which comprises a Zeolite KL in which the Zeolite crystals are cylindrical and have an average cylinder wall length of 0.1 to 0.6 microns, and an average cylinder wall length:diameter ratio of less than 0.5 and have microscopically flat basal planes, said Zeolite being the crystallization product of a mixture comprising q moles of water, a divalent cation present at a level of up to 250 ppm, a source of m moles of K_2O , a source of n moles of SiO_2 and a source of p moles of Al_2O_3 where m:n is 0.2 to 0.35 and n:p is 15 to 160 and q:m is 45 to 70, which Zeolite is further impregnated with a metal hydrogenation-dehydrogenation promotor.

References

The following references are relied upon by the examiner to reject the claims:

Drehman et al. (Drehman)	3,883,418	May 13, 1975
Wortel	4,544,539	Oct. 1, 1985
Buss	4,645,586	Feb. 24, 1987
Ellig et al. (Ellig)	4,870,223	Sep. 26, 1989
Application 07/855,017	5,491,119	Feb. 13, 1996

Rejections

Claims 1-4, 6-10 and 23-28 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Wortel.

Claims 11-16 stand rejected under 35 U.S.C. § 103 as being unpatentable over Buss in view of Wortel.

Claims 17 and 18 stand rejected under 35 U.S.C. § 103 as being unpatentable over Buss in view of Wortel and Drehman.

Claims 19-21 stand rejected under 35 U.S.C. § 103 as being unpatentable over Buss in view of Wortel and Ellig.

Claims 1-4, 6-10 and 23-28 stand rejected under 35 U.S.C. § 103 as being unpatentable over Wortel.²

Claims 1-4 and 6-10 stand rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 20-28 of U.S. Patent No. 5,491,119.³

²This is a new ground of rejection. We note that the examiner's statement of the rejection in the answer inadvertently included claim 5. Claim 5 was canceled in the amendment after final which the examiner approved for entry upon the filing of this appeal. See also page 1 of appellants' reply brief.

³This is a new ground of rejection in the answer. At the time the answer was mailed, this rejection was a provisional obviousness-type double patenting rejection over claims 22-31 of copending application 07/855,017. After the mailing of the answer, Application 07/855,017 issued as Patent No. 5,491,119 on February 13, 1996. Claim 26 in copending Application 07/855,017 was canceled and claims 22-25 and 27-31 were renumbered 20-28. We have taken the liberty of restating the rejection as it would exist under the present circumstances.

Opinion

We have carefully considered the respective positions advanced by appellants and the examiner. For the reasons set forth below, we will sustain the examiner's rejections.

REJECTION OVER WORTEL

The examiner rejected claims 1-4, 6-10 and 23-28 under 35 U.S.C. § 102(b) as being anticipated by Wortel and rejected the same claims under 35 U.S.C. § 103 as being unpatentable over Wortel. On page 4 of the brief, appellants state that claims 2, 6-10 and 23-27 stand or fall with claim 1 and that each of claims 3, 4 and 28 stands or falls alone.

Appellants claim a process for reforming a petroleum hydrocarbon feed stream. According to appellants, the reforming process includes dehydroisomerization of alkylcyclopentanes to aromatics, dehydrogenation of cyclohexanes to aromatics, and dehydrocyclization of acyclic paraffins and acyclic olefins to aromatics (specification: p. 2, lines 1-6). The process according to claim 1 comprises the step of contacting the hydrocarbon feed stream with a catalyst comprising a hockey puck or coin shaped zeolite crystals impregnated with a metal hydrogen-dehydrogenation promotor which appellants disclose to be a metal from Group VIII of the Periodic Table such as platinum (specification: p. 15-19). The zeolite is a crystalline product having microscopically flat basal planes prepared from a mixture comprising water, K_2O , SiO_2 , Al_2O_3 , and a divalent cation "present at a level of up to 250 ppm." The $K_2O:SiO_2$ molar ratio is 0.2 to 0.35, the $SiO_2:Al_2O_3$ molar ratio is 15 to 60, and the $H_2O:K_2O$ molar ratio is 45-70. The zeolite crystals have an average cylinder wall length to diameter ratio of less than 0.5. Claim 3, which is dependent on claim 1, recites that

the average height to length ratio of the cylindrical zeolite crystals is 1 to 1.2 wherein the height is the longest measurement of the cylinder height in the same direction as the cylinder wall length. Claim 4 is dependent on claim 3 and further limits the average height to length ratio to approximately 1. Claim 28 recites that the average length of the crystals is 0.1 to 0.3 microns.

Appellants disclose that the divalent cation may be an alkaline earth metal (specification: p. 18, lines 14-20). According to appellants, “[t]he inclusion of a divalent cation source in the zeolite synthesis mixture encourages the formation of flat basal planes and small crystals of low l/d [average cylinder wall length to diameter] ratio and reduces the formation of crystalline contaminants such as zeolite W and erionite” (specification: p. 17, lines 22-26). The amount of the divalent cation present in the mixture depends on the particular cation used (specification: p. 18, lines 23-25). The phrase “present at a level up to 250 ppm” is not defined in the specification. The phrase was added to claim 1 in an amendment after final (paper no. 10) which was approved for entry by the examiner (paper no. 11).⁴ In proceedings before the U.S. Patent and Trademark Office, an application claim is to be given its broadest reasonable interpretation which is consistent with the specification as it would be interpreted by one of ordinary skill in the art. *In re Sneed*, 710 F.2d 1544, 1548, 218 USPQ 385, 388 (Fed. Cir. 1983). The expression “up to 250 ppm” would include zero as lower limit. *In re Mochel*, 470 F.2d 638, 640, 176 USPQ 194, 195 (CCPA 1972). Appellants acknowledge that the expression would include zero as a lower limit, but argue that the inclusion of word “present” in the

⁴We note that although the amendment was approved for entry by the examiner, the amendment has not been clerically processed. This oversight should be corrected upon return of the application to the jurisdiction of the examiner.

phrase would mean that there is some divalent cation present. Here, we find that the phrase “present at a level up to 250” should not be construed differently from --up to 250 ppm of a divalent cation--. If the cation is “present” in a zero amount, it is simply not present in the composition. Accordingly, we interpret the phrase “present at a level up to 250 ppm” as including a zero amount of divalent cation in the zeolite mixture.

Wortel discloses a zeolite substantially similar to that claimed by appellant (col. 10, lines 24-45). The zeolite is described as being crystalline with a disk-shaped morphology and is prepared from a crystallizing gel comprising water, K_2O , SiO_2 and Al_2O_3 wherein the $K_2O:SiO_2$ molar ratio is 0.23 to 0.36, the $SiO_2:Al_2O_3$ molar ratio is 20 to 60, and the $H_2O:K_2O$ molar ratio is 30 to 80. These molar ratios overlap with or are within appellants’ claimed ranges. The zeolite is disclosed as having aspect ratio, i.e. the length of the cylinder to the diameter of the cylinder, of less than 0.5. According to Wortel, if the aspect ratio is less than 0.5, the cylindrical crystals have substantially flat basal planes (col. 6, lines 37-38) and the cylindrical particles forming the zeolite have a mean diameter of from about 0.5 to about 4 microns (col. 6, lines 56-61). Thus, if the aspect ratio is 0.49, the average length of the cylinder ranges from 0.2 to 2.0 microns which is within appellants’ claimed ranges as recited in claims 1 and 28.⁵ It is well settled that the disclosure in the prior of art of any value within a claimed range is a complete description and, thus, an anticipation of the claimed range. *In re Wertheim*, 541 F.2d 257, 267, 191 USPQ 90, 100 (CCPA 1976); *Ex parte Lee*, 31

⁵If the aspect ratio is, for example, 0.49, the length of the cylinder would be $0.49 \times 0.5 = 0.245$ or 0.2 microns for a lower limit and $0.49 \times 4.0 = 1.96$ or 2.0 microns for an upper limit.

USPQ2d 1105, 1106 (Bd. Pat. App. & Int. 1993). Even though Wortel does not disclose the average height to length ratio of the cylinder, a person having ordinary skill in the art would have interpreted the length of the cylinder described by Wortel as including an average height as well as the length of the cylinder. Under these circumstances, the average height to length ratio is 1 which encompasses claims 3 and 4. The zeolites are impregnated with a Group VIII metal such as platinum (col. 12, lines 2-23) and are useful for the same purpose as disclosed by appellants, namely, for catalyzing the conversion of a hydrocarbon feed under appropriate conditions to bring about aromatization of acyclic hydrocarbons (col. 10, line 27; col. 12, lines 30-47). For the foregoing reasons we find that Wortel presents a *prima facie* case of anticipation of claims 1-4, 6-10 and 23-28. Since anticipation is the epitome of obviousness, the rejection of claim 1-4, 6-10 and 23-28 under 35 U.S.C. § 103 is also affirmed. *In re Pearson*, 494 F.2d 1399, 1402, 181 USPQ 641, 644 (CCPA 1974).

Appellants argue that Wortel does not disclose incorporating a divalent metal cation to a maximum level of 250 ppm. Since we have interpreted the scope of appellants' claims as having zero ppm of a divalent cation, we do not find this argument persuasive. However, Wortel does disclose that "up to 30 mole % of the potassium in the zeolite may be replaced by a divalent cation such as calcium, barium or rubidium (col. 7, lines 5-55 and col. 10, lines 24-45). While Wortel, for purposes of anticipation, does not provide for or disclose a maximum level of 250 ppm of the divalent cation in the crystalline gel, it would have been obvious to a person having ordinary skill in the art under 35 U.S.C. § 103 to determine by routine experimentation the optimum amount of

the divalent cation which can be added to the gel to replace the potassium to achieve disc-shaped crystalline particles having an aspect ratio of less than 0.5 and having the molar ratios as disclosed by Wortel at col. 10, lines 41-45. This type of optimization is generally held to be a matter of obviousness for the skilled artisan. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Finally, appellant views the examiner's rejection as employing impermissible hindsight by reconstructing the claimed subject matter from bits and pieces of Wortel's disclosure. For reasons given *supra*, we do not share this view.

REJECTION OVER BUSS AND WORTEL

The examiner rejected claims 11-16 under 35 U.S.C. § 103 as being unpatentable over Buss in view of Wortel. Appellants state that claims 12-16 stand or fall with claim 11 (brief: p.4). Appellants concede that Buss discloses a process analogous to the process encompassed by claims 11-16, but argue that the references would not have suggested or directed a person having ordinary skill in the art to use appellants' specific catalyst in the second reaction zone. We disagree.

Buss discloses a reforming process wherein a hydrocarbon stream contacts two reforming catalysts. The second catalyst is a type L zeolite containing platinum (abstract; col. 2, lines 34-38; col. 4, lines 18-29). Wortel discloses a type L zeolite (abstract; col. 1, lines 7-8) as discussed in detail *supra*. It would have been obvious to one having ordinary skill in the art to use Wortel's type L zeolite catalyst in Buss' second reforming zone with the reasonable expectation that the catalyst would function as a reforming catalyst. For the foregoing reasons, we conclude that the combined teachings of Buss and Wortel would have established a *prima facie* case of obviousness. *In re*

Rijckaert, 9 F.3d 1531, 1532, 28 USPQ2d 1955, 1956 (Fed. Cir. 1993). Since appellant has not presented any objective evidence or arguments sufficient to rebut the *prima facie* case of obviousness, the examiner's rejection is affirmed. *In re Piasecki*, 745 F.2d 1468, 1471-1473, 223 USPQ 785, 787-788 (Fed. Cir. 1984); *In re Rinehart*, 531 F.2d 1048, 1051, 189 USPQ 143, 147 (CCPA 1976).

REJECTION OVER BUSS, WORTEL AND DREHMAN

The examiner rejected claims 17 and 18 under 35 U.S.C. § 103 as being unpatentable over Buss in view of Wortel and Drehman. According to appellants, this rejection stands or falls with claim 17 (brief: p.4). Buss and Wortel have been discussed *supra*. Drehman discloses a two stage reforming process wherein the hydrocarbon feed stream is passes through a first reforming zone containing an acidic reforming catalyst; the product is then split into three fractions based on boiling points, the second fraction of which is split into an aromatic rich stream and a paraffin rich stream; and the paraffin rich stream is passed through a second reforming zone containing a catalyst to effect dehydrogenation and cyclization of paraffins (col. 4, lines 37-62). Since Wortel discloses a reforming catalyst, a person having ordinary skill in the art would have been motivated to employ Wortel's catalyst disclosed at col. 10, lines 24-45 in the second reforming zone of Drehman's process with the reasonable expectation of reforming the paraffin fraction.

Appellants argue that the examiner used hindsight in making the rejection. We disagree. The teachings of Drehman and Wortel alone establish a *prima facie* case of obviousness. For these reasons, the rejection of claims 17 and 18 is affirmed.

REJECTION OVER BUSS, WORTEL AND ELLIG

The examiner rejected claims 19-21 under 35 U.S.C. § 103 as being unpatentable over Buss in view of Wortel and Ellig. Appellants concede that claims 20 and 21 stand or fall with claim 19 (brief: p.4). Appellants argue that Ellig does not teach fractionating the hydrocarbon stream into a first hydrocarbon stream containing 8 or more carbon atoms and a second hydrocarbon stream containing 6 or 7 carbon atoms, and then passing the first stream through the first reaction zone containing a catalyst and passing the second stream through a second reaction zone containing the zeolite catalyst as required by claim 19. We are not persuaded by this argument.

Buss discloses that the hydrocarbon stream can be fractionated into two separate streams with each stream contacting a separate catalyst in parallel. Buss suggests that the first stream could contact a first (conventional) reforming catalyst while the second stream could contact a zeolitic type reforming catalyst (col. 6, lines 22-32). In view of the teachings of Ellig and Buss, it would have been within the skill of the art to fractionate a hydrocarbon stream into separate streams and to specifically isolate a stream rich in hydrocarbons having 6 or 7 carbon atoms for reforming using a type L zeolite catalyst. It is known from Ellig that a fraction rich in hydrocarbons having 6 or 7 carbon atoms can be reformed using a type L zeolite (abstract; col. 1, lines 10-17, col. 3, lines 33-38; Example III). Since Wortel's discloses a type L zeolite catalyst, for reasons discussed *supra*, it would have been within the skill of a person having ordinary skill in the art to use Wortel's zeolite catalyst in Buss' second reaction zone. For the forgoing reasons, we conclude that the combined

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teachings of Buss, Wortel and Ellig would have led a person having ordinary skill in the art to the claimed process. Accordingly, the examiner's rejection of claims 19-21 will be sustained.

OBVIOUSNESS-TYPE DOUBLE PATENTING

The examiner rejected claims 1-4 and 6-10 under the judicially created doctrine of obviousness-type double patenting over claims 20-28 of U.S. Patent No. 5,491,119. Appellants did not argue the merits of this rejection, but indicated on page 1 of their reply brief that an appropriate terminal disclaimer in compliance with 37 CFR § 1.321(b) would be submitted in the event that the claims on appeal would be found patentable over the prior art. Since an appropriate terminal disclaimer has not been filed, we will affirm the examiner's rejection.

Conclusion

For the foregoing reasons, the decision of the examiner rejecting claims 1-4, 6-21 and 23-28 is affirmed.

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No time period for taking subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED

EDWARD C. KIMLIN
Administrative Patent Judge

CAMERON WEIFFENBACH
Administrative Patent Judge

CHUNG K. PAK
Administrative Patent Judge

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